

Aging and the alimentary tract

The aging oesophagus

Introduction

Diagnosing and treating gastrointestinal disorders in elderly patients requires that the physician be acquainted with both psychological and physical alterations induced by aging. Diseases of the oesophagus in elderly patients may be associated with the classic complaints of dysphagia, regurgitation, chest pain, and heartburn. However, atypical presentations are more common in this age group, and there is a greater likelihood of concurrent disease that may confound the interpretation of symptoms. Elderly patients are also more susceptible to complications that may accompany inadequately treated or long-standing oesophageal disease, such as aspiration, malnutrition or Barrett's adenocarcinoma.

Oesophageal function and aging

Oesophageal function in elderly patients has been studied in several cross-sectional studies. Only one prospective study on the effect of aging on oesophageal function was reported, in a rather young group of healthy volunteers.¹ Earlier literature suggested a rather common degeneration of oesophageal function with aging. The term presby-oesophagus was proposed to describe an age related decrease in contractile amplitude, polyphasic waves in the oesophageal body, incomplete sphincter relaxation, and oesophageal dilatation.² This notion has been abandoned more recently as it was felt that most motility disorders in old age are related to medical problems that accumulate during aging, such as diabetes mellitus, neurological disorders and the intake of numerous drugs. Investigations in healthy elderly people have shown only minor to mild alterations in oesophageal motility.

A gradual decrease in upper oesophageal sphincter (UOS) pressure occurs with age, with a delay in UOS relaxation after deglutition.³⁻⁴ Pharyngeal contraction pressures and pharyngo-oesophageal wave velocity are notably increased.^{3,4} The changes are attributed to increased resistance to flow across the UOS as a result of loss of compliance with age. The sensory threshold for the initiation of deglutition may also be increased with age.⁵

With increasing age, there is a significantly increased occurrence of synchronous contractions and failure of contractions after deglutition in the distal oesophagus.^{2,6-9} Conflicting data were reported on the influence of aging on the amplitude of peristaltic contractions, suggesting that probably no major changes occur.⁶⁻¹⁰ Radiographic and scintigraphic studies demonstrated more frequently occurring abnormalities of oesophageal transit in elderly people, but without a clear correlation with symptoms of presumed oesophageal origin.¹¹

Initial studies suggested more frequently occurring impaired relaxation or impaired contraction of the lower oesophageal sphincter (LOS) with age,² but more recent studies failed to demonstrate a significant change in resting LOS pressure with age.⁷⁻¹⁰

Studies to assess the influence of age on reflux patterns in asymptomatic subjects have yielded conflicting results. Gastric emptying does not differ between young and old volunteers.¹² In the absence of atrophic gastritis, acid secretion is not altered by aging.¹³ Increased body weight and hiatal hernia, both setting the stage for reflux, are more prevalent in older subjects, and secondary oesophageal

peristalsis, a major clearance mechanism for refluxed acid, is evoked less frequently and less consistently.¹⁴ Hence, an increased incidence of gastro-oesophageal reflux with age does not seem unlikely. However, several studies failed to show a significant difference in the duration or frequency of reflux episodes with increasing age.^{15,16} Smout *et al* demonstrated significantly increasing oesophageal acid exposure and longer duration of reflux episodes with age.¹⁷ Richter *et al* also observed that subjects over 50 years of age had more long-lasting reflux episodes, but this did not result in significantly higher acid exposure.¹⁸

Overall, except for the decreased likelihood of a peristaltic response to wet swallows, the age related changes in oesophageal physiology seem to be mild or minimal. Neuromuscular degeneration may account for some of the observed differences. However, the thickness of oesophageal smooth muscle does not vary between young and old subjects.¹⁹ In the human oesophagus, the number of myenteric neurones in the oesophagus decreases with age.¹⁹ Conceivably, partial denervation might contribute to disordered peristalsis, but the precise relation between the reduction in the number of myenteric neurones and the frequency of oesophageal motor dysfunction in elderly patients remains to be explored.

Dysphagia in the elderly

Dysphagia is a very common complaint in the elderly. Up to 10% of people over the age of 50 report troublesome dysphagia,²⁰ although the majority do not consult a physician for these symptoms.²¹ In older people, dysphagia is also correlated with important morbidity and even mortality: nursing home patients with dysphagia have significantly higher six-month mortality than those without.²² In patients with oropharyngeal dysphagia and associated aspiration, increased morbidity and mortality have been found.²³

Dysphagia can result from a variety of defects affecting either the oropharynx (swallowing disorders) or the oesophagus. Clinical history, observing the patient swallow and endoscopic and/or radiographic examination allow one to differentiate between oropharyngeal and oesophageal causes of dysphagia, and to distinguish structural or functional underlying disease (table 1). Most elderly patients have functional type dysphagia.

The reason for the high rate of dysphagia in the elderly is unclear, as studies in asymptomatic individuals have only been able to show minimal age related changes. Swallowing disorders, characterised by the inability to transfer food from the mouth to the upper oesophagus, are common in the elderly. Most of these patients have a functional abnormality of the oral or the pharyngeal stage of swallowing, which can be identified on video fluoroscopy. One study reported that, even in elderly patients without dysphagia, video fluoroscopy shows abnormalities in up to 63%.²⁴ Therefore, it seems likely that swallowing disorders are often undiagnosed and untreated in the elderly. Swallowing disorders are most commonly seen in patients with cognitive-perceptive changes or neurological deficits (table 1). In these patients, disordered swallowing is often only one manifestation of a multi-faceted disease process. In a number of swallowing disorders, the underlying cause can be treated—for example, Parkinson's disease. In others, rehabilitation techniques are

TABLE 1 Causes of dysphagia in the elderly

	Oropharyngeal	Oesophageal
Structural	Neoplasms	Peptic stricture
	Infections	Rings and webs
	Zenker's diverticulum	Neoplasm
	Vertebral osteophytosis	Vascular compression
	Postsurgical	Diverticula
Functional		Reflux or drug induced oesophageal injury
	Cerebrovascular accident	Achalasia
	Amyotrophic lateral sclerosis	Diffuse oesophageal spasm and related disorders
		Idiopathic aperistalsis
	Multiple sclerosis	Scleroderma
	Brainstem neoplasm	Diabetes
	Postpoliomyelitis	Parkinson's disease
	Peripheral neuropathies	Drug induced oesophageal dysfunction
	Muscular dystrophies	
	Parkinson's disease	
	Polymyositis and dermatomyositis	
	Myasthenia gravis	
	Cricopharyngeal dysfunction	
	Metabolic myopathy (e.g. thyroid dysfunction, hypercalcemia)	
	Idiopathic neuromuscular dysfunction	

used, often combined with dietary changes, changes in position, or by techniques to improve oral control and sensitivity to food in the mouth. Unfortunately, a substantial group of elderly patients have permanently impaired swallowing, necessitating the use of feeding gastrostomy or jejunostomy. Myotomy of the cricopharyngeal muscle can be used to treat patients with documented obstruction caused by that muscle. Injection of botulinum toxin may offer a therapeutic alternative in these patients, although its exact place in treatment has yet to be determined.²⁵

In a subset of elderly patients with functional oesophageal disease, primary oesophageal motility disorders such as achalasia or diffuse oesophageal spasm are readily identified.⁹ Elderly patients with achalasia respond poorly to medical therapy, but they respond well to pneumatic dilatation.²⁶ Botulinum toxin injections into the LOS provide effective symptom relief in older patients with achalasia.²⁷ As it is less invasive, botulinum toxin may become the treatment of choice in elderly patients. Older people also show an increased incidence of disorders associated with impaired oesophageal motility, such as diabetes, Parkinson's disease, hiatal hernia, and neuropathy. However, a substantial group of elderly patients with dysphagia have unexplained aperistalsis, which is not part of a classic primary motility disorder.⁹ It is unclear whether this is an atypical manifestation of a classic primary motor disorder, or a yet unclassified oesophageal motor disorder, or whether these observations are merely an extreme of the spectrum of age related oesophageal dysfunction. Unfortunately, no studies have reported whether this aperistaltic condition responds to treatment with calcium antagonists, nitrates or botulinum toxin injection.

From these data, it is clear that further studies are needed on different aspects of deglutition and oesophageal peristalsis in the elderly. Moreover, it seems likely that swallowing disorders are often undiagnosed and untreated in geriatric patients. The role of concurrent disease and medication in oesophageal motor disorders in the elderly has yet to be studied systematically. Therapeutic trials in elderly patients with oesophageal aperistalsis are badly needed.

Gastro-oesophageal reflux disease in the elderly

Gastro-oesophageal reflux disease (GORD), defined as the occurrence of histopathological alterations or symptoms due to reflux of gastric contents into the oesophagus, is common throughout adult life. Several studies suggest that

this disorder becomes more prevalent with age.²⁸ The prevalence of acid reflux in older primary care outpatients may be as high as 20%, although many of these patients do not report heartburn.²⁹ In elderly patients, reflux disease may be more difficult to diagnose for several reasons. Oesophageal sensitivity seems to decrease with age, and there is a tendency for older people to under report and tolerate symptoms that young people would find less tolerable.³⁰⁻³¹ Moreover, coexistent illnesses such as chronic obstructive pulmonary disease and coronary artery disease, which can be confused with or exacerbated by GORD, are more common in the elderly. Finally, in the aged, symptoms of GORD are regurgitation, dysphagia, chest pain, respiratory symptoms and vomiting, rather than heartburn.³² When pyrosis is present, oesophageal mucosal disease is more severe in the elderly.³³ A large subset of elderly patients with oesophagitis do not have typical reflux symptoms. In view of these findings, it seems likely that reflux disease in the elderly is often undiagnosed and untreated, especially as an underlying cause of pulmonary symptoms.

As oesophageal function is relatively well preserved with age in healthy subjects, an explanation for the increased incidence of GORD in the elderly is unclear. Prolonged stationary and ambulatory LOS sleeve manometric studies have demonstrated that transient LOS relaxations are the main mechanism underlying reflux episodes in healthy subjects and in patients with reflux disease.³⁴⁻³⁵ It is unclear whether the same applies to GORD in the elderly, or whether other mechanisms play a major role in this population. Furthermore, in many older people, as a result of concurrent disease and medication, decreases in salivary flow, gastric acid production, oesophageal motility, gastric emptying, and LOS tone may be present. The role of concurrent disease and medication in GORD in the elderly has yet to be studied.

State-of-the-art pH monitoring studies failed to show increased acid exposure in the elderly. As the presence of atrophic gastritis and achlorhydria increases with age,³⁶ a higher prevalence of non- or less acidic reflux in the elderly seems likely. This hypothesis might not only explain the lower prevalence of heartburn, but also the more severe mucosal disease found in elderly patients with reflux disease. Recent studies have highlighted the role of duodenogastro-oesophageal reflux in patients with higher grades of reflux oesophagitis.³⁷ So far, no data are available on the role and prevalence of bile reflux in elderly healthy volunteers or in elderly patients with GORD. It is unclear whether decreased oesophageal tissue resistance in the elderly, as a result of impaired epithelial cell regeneration, also contributes to more severe mucosal disease.

Older patients seem to need higher levels of acid suppression to heal oesophagitis and to relieve symptoms, than younger patients.³³⁻³⁸ It is unclear whether the same holds true for maintenance treatment for reflux disease in the elderly. However, in view of the prevalence of pulmonary symptoms in elderly patients with reflux disease, they could respond more favourably to a treatment regimen that includes prokinetic agents. So far, no clinical studies have tackled this specific question in older patients.

Oesophageal cancer in the elderly

The main risk associated with long-standing GORD is adenocarcinoma arising from Barrett's metaplasia.³⁹ The prevalence of Barrett's oesophagus increases with age, reaching a plateau by the seventh decade.⁴⁰ The length of columnar epithelium does not seem to increase significantly with age.⁴⁰ Over the past 20 years, the incidence of adenocarcinoma of the oesophagus and the gastric cardia has increased at a rate exceeding that of any other cancer.⁴¹ Barrett's oesophagus (specialised columnar epithelium) is the only known risk factor for these malignancies, and its

incidence rises with age.³³⁻⁴⁰ Adult Caucasians frequently have unrecognised segments of specialised columnar epithelium at the gastro-oesophageal junction.⁴² It has been suggested that this underlies the rising frequency of cancer of the gastro-oesophageal junction, as adenocarcinomas located at the junction are associated with Barrett's metaplasia in at least half of the patients.⁴³ Thus, it seems likely that an increasing group of elderly patients with adenocarcinoma of the gastro-oesophageal junction will come to medical attention. Recently, successful endoscopic treatment of Barrett's epithelium, with or without early malignant changes, has been reported.⁴⁴⁻⁴⁵ Larger scale prospective studies will be needed to confirm the successful application of these techniques in treating or preventing the development of malignancy in patients with Barrett's metaplasia at the gastro-oesophageal junction. If effective, endoscopic ablation may provide an alternative to surgery for high-grade dysplasia or early adenocarcinoma in high-risk surgical patients, and it may have the potential to decrease the occurrence of oesophageal carcinoma in patients with known Barrett's oesophagus. Meanwhile, most elderly patients with oesophageal cancer are not fit for surgical resection. Palliative treatment using expandable stents, laser photocoagulation, photodynamic therapy, ethanol injection, or radiotherapy may provide relief of dysphagic symptoms.⁴⁶ Trials comparing effectiveness, cost and patient preference of these different treatment modalities are needed.

Conclusion

Overall, the age related changes in oesophageal physiology seem to be mild or minimal. In contrast to these observations, dysphagia and GORD occur extremely frequently in elderly patients. It seems likely that swallowing disorders and GORD are often undiagnosed and untreated in geriatric patients. In many cases, the optimal mode of treatment in the elderly has not been established, or available treatment options are insufficient. The incidence of adenocarcinoma of the oesophagus and the gastric cardia, associated with long-standing GORD and Barrett's oesophagus, has increased rapidly over the past 20 years. Endoscopic ablation may have the potential to provide an alternative to surgery for early stages of this type of tumour in high-risk surgical patients. In the meantime, a growing population of elderly patients with oesophageal cancer will need palliative treatment of dysphagic symptoms. Trials comparing effectiveness, cost and patient preference of different treatment modalities for palliative treatment of oesophageal malignancy are needed.

JAN TACK
GASTON VANTRAPPEN

Department of Internal Medicine,
Division of Gastroenterology,
University Hospital Gasthuisberg,
Herestraat 49, B-3000 Leuven, Belgium

Correspondence to: Dr Tack.

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